

IN THE SUBSTITUTE SPECIFICATION

Please cancel paragraphs 007, 008, 020, 027 and 033 of the Substitute Specification which was filed with the application. Please replace those cancelled paragraphs with replacement paragraphs, also 007, 008, 020, 027 and 033, as follows.

[007] In accordance with the present invention, the object is attained by the provision of a printing press having at least one printing group with at least one forme cylinder, one transfer cylinder and one counter-pressure cylinder. An image sensor records an image of an imprinted substrate which has been printed in color. That image is evaluated in an evaluating unit. The evaluating unit generates an actuating signal to an actuating drive mechanism for regulating the register. The data provided to the evaluating unit is compared to data from a previously recorded image. The evaluation unit separates the image into its color components. Each forme cylinder has its own separate, independently controlled drive motor.

[008] The advantages which can be attained by the present invention reside, in particular, in that it is possible, by providing images of the entire imprinting substrate width, to simultaneously obtain several data, for use in regulating the printing process, in a single evaluating unit. Also, separate types of sensors, with associated separate evaluating units, are not required for the various regulating paths in the printing press. Instead, the image sensor alone provides the data which is required for several parameters which are relevant to the printing process in the printing press and which can be influenced by control systems, such as adjusting the supply of ink or dampening agent, or the registration or registers, for example. This has advantageous effects on the costs for setting up and for maintaining the regulating system, as well as on the speed of reaction, such as, for example, in the case of detected deviations from the regulation. The above-mentioned parameters, which are relevant to the printing process, can

simultaneously be controlled by a single regulating device having an image sensor and only one evaluating unit. The parameters can be corrected, if needed, which correction, because of the rapid intervention and regulating possibilities it provides, contributes to keeping the amount of waste in the printing process low and to the assurance of a high production quality over the entire printing process. By the use of the integral detection and the evaluation of the data in a single evaluating unit or computing device, the logging of the data, and the documentation of the quality of the printed products going hand-in-hand with it, as well as statistic analyses regarding the printing process, are made easier. This is because of the omission of interface problems which otherwise would have to be solved. An image of every produced printed piece is recorded, a check of individual pieces takes place, not only a spot check. Accordingly, a 100% check is accomplished during the printing process, so that printed copies, that are lacking in quality, can be removed or at least can be marked. Separate register markings, test fields or print control strips, which are applied to the imprinting substrate in addition to the actual printed image, are not required for regulating the color density of a color applied to the imprinting substrate by the printing press, or for checking that the register of the printed image is maintained. This is advantageous, because for one, such register markings require additional space on the material to be imprinted. Those register markings also only provide an indirect reference to the actual position of the color components, with respect to each other, which color components, in their totality, constitute the printed image.

[020] An illuminating device 27, such as, for example, a flash lamp 27, is advantageously assigned to the image sensor 22. Brief light flashes which are emanating from the flash lamp 27 make rapidly progressing movement actions, such as the printing process represents, appear to stand still by the performance of a stroboscopic method, and in this way make the imprinted substrate image observable to the human eye. With a sheet-fed printing press in particular, the

recording of the printed image, that is performed ~~by the~~ by the image sensor, can also take place in, or at a delivery device 28 of the printing press, which is shown in the drawing figure by a dashed representation of the image sensor 22 and the associated illuminating device 27 as a possible option for recording the printed image downstream of the last printing group 04 of the respective printed side, or at the end of the printing press. By an appropriate selection of the image sensor 22, and possibly also of the associated illuminating device 27, it is possible to extend the recording of the image into a virtually non-visible range, such as, for example, into the infrared or the ultraviolet range, or displace it into them. As an alternative to the preferred utilization of an area camera 22 with a flash lamp 27, the employment of a line camera with a permanent illuminating device is also possible.

[027] In this case, a register measurement in the printed image is the basis for the register regulation. After all of the colors which are required for the printed image have been imprinted, the entire printed image is recorded by the camera or image sensor 22, preferably at the outlet of the printing press. A dissection of the recorded printed image takes place in the evaluating unit 23, preferably into the various color components CMYK which are customary in printing technology, as well as an analysis of suitable portions of the printed image and a relative position determination of a color component₁ with respect to a reference color component₁ by the use of correlation methods with a previously recorded or obtained printed reference image.

[033] While a preferred embodiment of devices for controlling at least one register in a printing machine, in accordance with the present invention, ~~have~~ has been set forth fully and completely hereinabove, it will be apparent to one of skill in the art that various changes in, for example, the specific type of substrate being printed, the structure of the delivery device, and the like could

be made without departing from the true spirit and scope of the present invention which is accordingly to be limited only by the appended claims.